

RS3-25

## CANDY - CALORIES FOR COMBAT

*When the Japs struck at Pearl Harbor, one of America's most popular foods—candy—was not prepared to go to war. Since candy is deeply entrenched in American food habits and is widely depended upon as an "energy booster" as well as an in-between-meals appetite appeaser, this bit of military unpreparedness takes on more importance than at first meets the eye. However, something was quickly done about it—as the article that follows will show.*

By H. B. Cosler

Early in 1942, the National Confectioners' Association was asked to name a small group of technical representatives of the candy industry to meet at the Subsistence Research Laboratory at the Quartermaster Depot in Chicago with the object of writing a specification for use in the procurement of candy. Fortunately, a high percentage of the candy industry was located in the Chicago area, and it was easy to appoint a representative group located within a few miles radius of the Depot. This group, of which the writer was a member, met several times and for several hours each time at the Laboratory. After much consultation and planning a draft for a candy specification was completed.

It was a fine "inclusive" specification, or perhaps a better term would be "a standardized formula book for a manufacturer of candy." It covered everything from jelly beans to the finest box of chocolates. The problems of global warfare, however, were far from the minds of the participating authors of the specification. Had it been possible to conduct the war in cool, dry climates or else in air-conditioned quarters, this "spec" would have left nothing to be desired—and nothing further to do.

### changing the candy concept to meet combat conditions

The war progressed rapidly and as it progressed, the concept of the problems involved was greatly en-

larged. It was recognized that it would not be a simple matter to adapt supplies, including candy, to fit the varying conditions of military handling and use. Candy had always been considered a perishable or semi-perishable product designed to reach the consumer within a period of a few days or a few weeks after manufacture.

To the public the term candy means carbohydrates—"sugar and spice and everything nice." Except for the "everything nice," this is far from the truth. Although a high percentage of the components of almost all candy is carbohydrate, only a limited number of types such as starch gums and jellies, hard candy, lozenges, and uncoated creams are entirely carbohydrate. All other types, including caramels, toffees, nougats, fudges, solid chocolate, and chocolate coated bars and pieces, contain substantial percentages of fat, milk products, fruits, coconut, peanuts, nuts, and whipping agents such as egg or soy albumen. The oils and proteins in these materials are quite vulnerable to deteriorative changes. In the latter types, which are by far the most popular commercially, stability is a definite problem.

It was soon realized that our Armed Forces would be fighting in areas from the tropics to the Arctic and that candy would have to meet these climatic conditions. As a result, the original candy specification was never published.

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Candy was considered a highly desirable item to have in the rations, both because of its high caloric density and its morale value. All commercial type chocolate had to be eliminated because of temperature conditions, particularly in the tropics. A solid chocolate bar of low cocoa butter content and containing oat flour had been developed that withstood high temperatures fairly well. Toward the end of the war this was replaced with a "sweet enriched chocolate bar" containing a lower percentage of cocoa butter and higher percentage of moisture than commercial type bars. Because of lack of stability, all other types of candy except the all-carbohydrate bars—starch jellies and hard candy—were eliminated from ration procurement during most of the war years. Shortly before the close of the war, wrapped caramels and an uncoated fudge were added, but their stability was questionable.

#### cooperative concentration on candy coatings

After the close of World War II it was realized that candy should be as well prepared for any future conflict as other foods.

It was natural to assume that although a man changes from a civilian to a member of the Armed Forces, his preference for certain types of candy does not change. The most popular type of candy is chocolate or chocolate coated candy. If a chocolate coating could be developed that would remain stable and would not melt or bloom when subjected to temperatures of 100° F., many additional desirable varieties could be added to the rations. After a long period of development in the QMFCI laboratory, in cooperation with a nearby candy plant, this objective was accomplished through the use of higher melting point fats to replace the cocoa butter. This

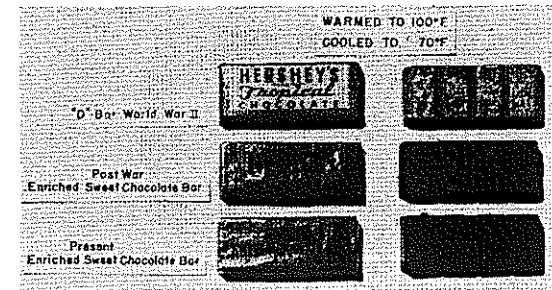
idea was not new but previously the use of any fat having a melting point above body temperature was unsatisfactory in eating quality. By the addition of certain emulsifiers, the higher melting point fat (114° F.M.P. as specified at present) disperses in the mouth giving a similar reaction to the melting of the cocoa butter in chocolate. This coating has been used on candy bar procurements for the past two years. It does not melt at 100° F. and does not bloom on cooling. The use of the higher melting fats causes the coating to crack more easily at low temperatures. Our problem at present is to increase the plasticity—a quality which has a twofold advantage: namely, pliability and softness.

#### continuing considerations concerning keeping quality

The development of a satisfactory coating did not mean that all coated bars could be used in rations. The problems of rancidity of fats, drying out of centers, and deterioration of coconut, peanuts, and nuts remained. Fortunately, in the past few years, the refining of fats has been greatly improved, more efficient antioxidants have been developed, and new and effective humectants are being manufactured. By the use of hydrogenated fats, antioxidants, nonfat milk solids, and the addition of sorbitol as a humectant, satisfactory chocolate and vanilla fudge centers, and a combination caramel nougat center for coating are being procured for rations. The same materials are utilized in the individually wrapped caramels which are overwrapped to form a bar. Their stability is very good. However, no solution has been found as yet for the deterioration of coconut, peanuts, and nuts in coated bars.

The "sweet enriched chocolate" bar, adopted in the latter part of World War II, had many favorable

These chocolate bars (shown wrapped at left, unwrapped at right) illustrate 12 years of progress in elimination of "bloom" (surface fat deposit). The present bar at bottom is free of bloom in noticeable contrast to its predecessors above.



characteristics. However, it did become almost liquid at 100° F. and when warmed to 100° F. then cooled, developed considerable bloom which made it unappetizing in appearance. A new bar has been developed which eliminates both of these undesirable features. This has been accomplished by making use of the higher melting fats and emulsifiers as explained earlier regarding coatings. Although the stability and acceptability are good, it is not equal to the commercial chocolate bars in eating quality. Our present problem is to improve the bar so as to approach or equal commercial bars in acceptability while still maintaining the required stability.

Two new bars are in the development and testing process at present. One is a coated nougat type and the other an uncoated butter-cream type. If proven satisfactory, these bars would provide additional candy variety in operational rations.

When space is at a premium—a chronic state of affairs in wartime military operations—and when high caloric intake is necessary or desirable, candy is an ideal answer. In addition to its high density and caloric value, it is in a convenient form to eat. An illustration of how these characteristics can be utilized is the survival ration. The Food Packet, Abandon Ship, consists entirely of candy and chewing gum. The problem in this case is to de-

velop candies which will withstand short periods of exposure to temperatures as high as 160° F. This condition sometimes exists in the lifeboats on the decks of ships passing over or near the equator; the Food Packets are stored within these lifeboats. To meet this situation, two types of candy are now under test. The items are packed in the Food Packet and stored at 70° F., 100° F., 140° F., and in a cycling oven where 160° F. is maintained for four hours following which the temperature gradually falls to 90° F. in eight hours, remains at that level for four hours, and gradually increases to 160° F. in the next eight hours. The latter 24-hour cycling procedure attempts to duplicate equatorial conditions as found on a ship's deck.

An all-purpose survival bar high in fat, carbohydrate, and protein is also being tested but is far from final development. In this case all three problems connected with ration foods are unsolved as yet—namely, nutrition, stability, and acceptability.

Candy is well recognized to be an excellent and convenient food for the quick relief of fatigue. The Food Packet, Individual, Fighter Pilot, consists entirely of candy and chewing gum. Storage tests now under way may show that some changes may be necessary.

Candy has made rapid progress in its preparation for three-dimen-

activities report

sional global war. Many and varied problems must be solved before it can be said that it is completely prepared, but it is safe to conclude from past progress that the difficulties will be substantially met and, in many instances, overcome entirely. In the meanwhile, the present

status of candies in the ration is far from desperate. The serviceman is even now receiving a familiar food that is reasonably well adapted to the ups and downs of military storage life.

*H. B. Cosler  
Technologist  
General Products Division*